This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

Fishing and Rental Tool Services



HOMCO Internal Steel Liner Casing Patch

Weatherford

Fast, permanent casing leak repairs with the Homco steel liner casing patch.

Applications

Designed to seal perforations, collar and thread leak, splits, limited corrosive areas in tubing and casing and to provide added protection on the squeeze jobs, the Homco Internal Steel Liner Casing Patch is as versatile as it is effective. It can be successful placed to any depth and has repeatedly sealed leaks and perforations where cementing efforts have failed.

Patches can be used in production wells, in wells that have to be deepened after patching and in disposal storage wells.They are permanent yet can be removed from the well bore by milling.

Advantages

The Homco Internal Steel Liner Casing Patch has achieved worldwide acceptance. Skilled Weatherford personnel, using special setting tools and techniques have installed over 10,000 patches to date.

The Homco Internal Steel Liner Casing Patch offers significant advantages over other sealing methods.

Speed

❑ Repairs are made quickly, Total setting time is limited only by round trip time.

❑ Operations can be resumed as soon as the setting tool is pulled and the patch pressure tested.

Reliability

❑ Steel makes the seal and is not likely to crack or crumble. An epoxy resin, spread on a fiberglass mat covering the outside diameter of the steel liner, will extrude into leaks and cavities in the casing wall and act as a gasket and secondary sealing agent.

❑ The setting tool is designed for twice the normal operating pressure.

Versatility

❑ The casing patch is available in 20 foot lengths up to several hundred feet.

❑ Weatherford has a complete line of tools and patches for over 60 different sizes and weights of tubing and casing for 2⅞ to 26 inches.

❑ The casing patch is available worldwide through all Weatherford service locations.

❑ ⅛ inch thick liners are available for normal patching operations. A new heavier wall liner has been developed, successfully used, and is now available for higher pressure operations. Also available, upon request, is a special liner material for highly corrosive conditions, and one for high temperature wells (600°F).

❑ Patches can be run through and set below previously installed patches of the same type.

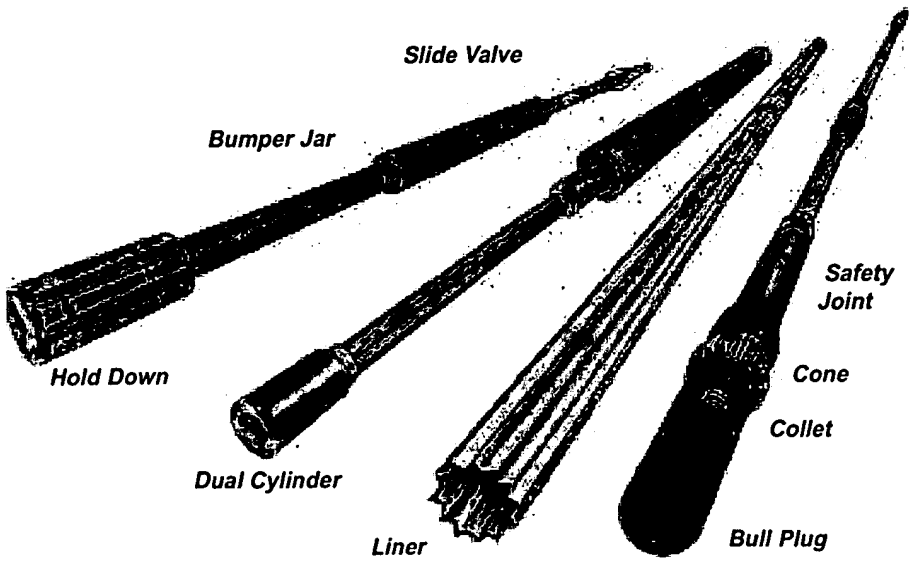
The Homco Internal Steel Liner Casing Patch requires special setting tools and techniques. Installation must be made by Weatherford personnel.

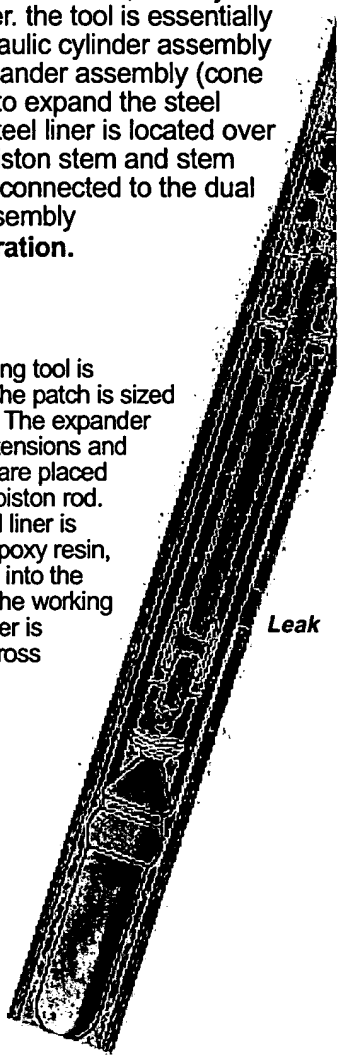
Tool Components...

The major components of the setting tool include the slide valve, bumper jar, hold down, dual cylinder and liner. the tool is essentially a dual hydraulic cylinder assembly with an expander assembly (cone and collet) to expand the steel liner. The steel liner is located over the lower piston stem and stem extensions connected to the dual cylinder assembly

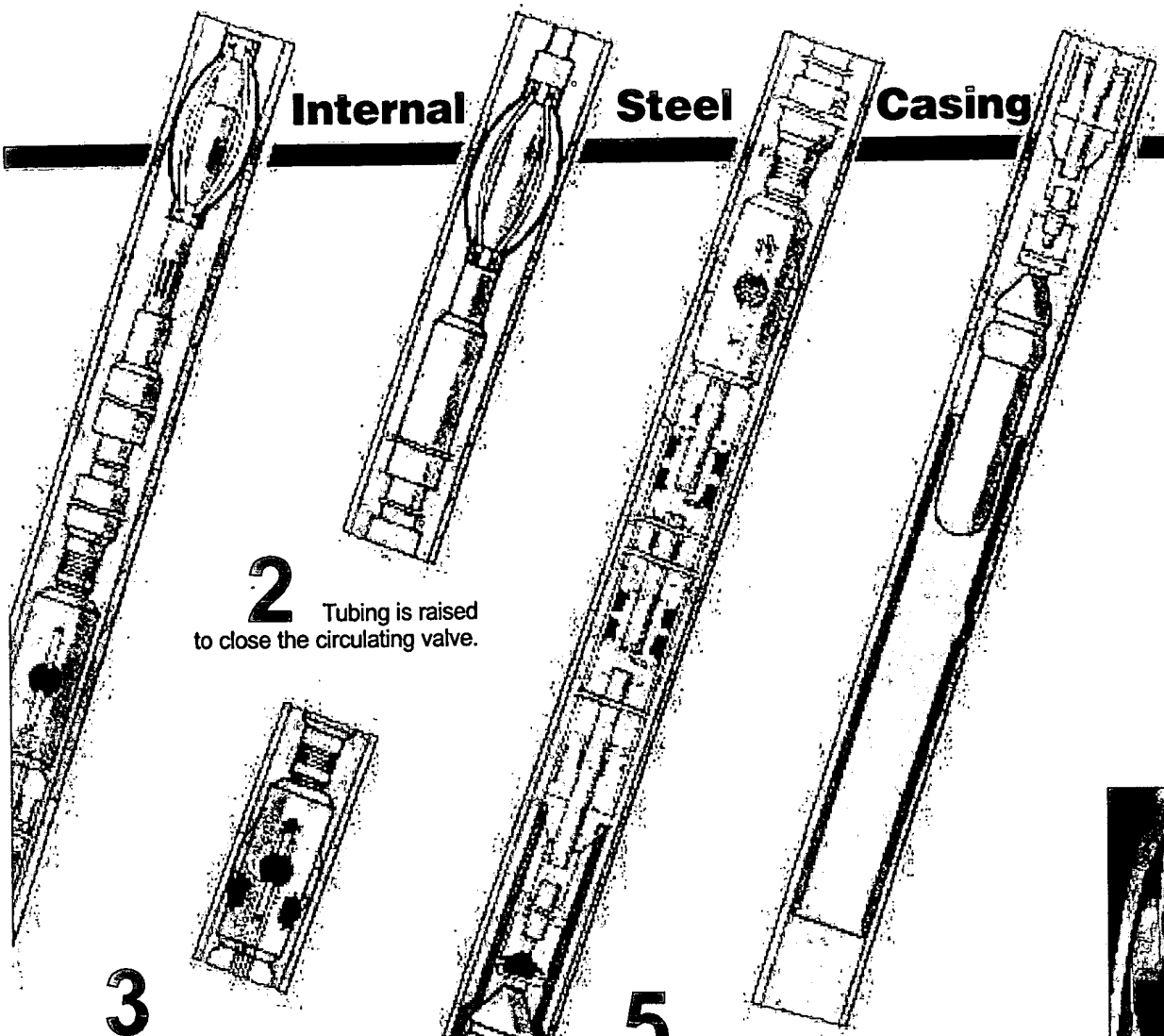
...and Operation.

1 The setting tool is assembled. The patch is sized to the casing. The expander assembly, extensions and casing patch are placed on the lower piston rod. After the steel liner is coated with epoxy resin, the tool is run into the well bore on the working string. The liner is positioned across the leak area.





Internal Steel Casing Patch



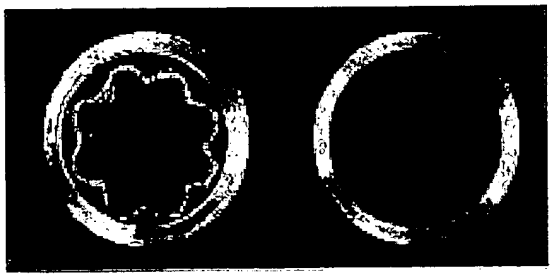
2 Tubing is raised to close the circulating valve.

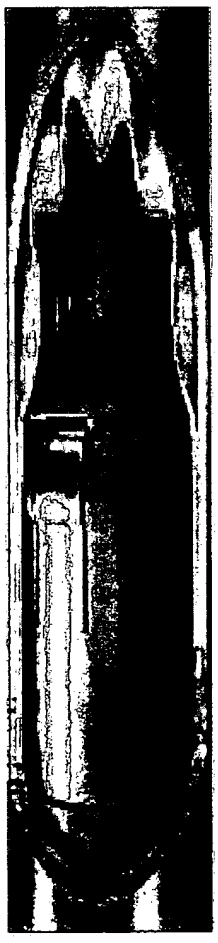
3 Hydraulic pressure is applied to force out buttons on the hydraulic hold down. This anchors the cylinder firmly and isolates the workstring from all tensile loads caused by the setting operations.

4 Pressure on underside of piston pulls expander assembly into the bottom of the corrugated patch. As pressure increases, the expander assembly is forced further into the patch, expanding it against the inside of the casing. Five feet of patch can be expanded in one stroke. The circulating valve is opened by lowering tubing and telescoping the slide valve. Tubing is raised again to pull up the cylinders in relation to pistons held down by the expander assembly. Expanded section of patch is anchored to the casing wall by friction caused by compressive hoop stress. Hydraulic pressure is again applied to tubing after closing the circulating valve. Hydraulic hold down buttons expanded to anchor the cylinder in a new, higher position.

5 The expander assembly is again forced through the corrugated patch, expanding it against the inside of casing. This procedure is continued until the entire patch is set. The epoxy resin coating (that was applied in step 1) is extruded into any leaks or cavities in the casing wall and acts as a gasket and additional sealing agent. Setting time normally requires less than 30 minutes for a 20 foot patch. The tool is then removed from the hole and the patch is pressure tested as required.

A casing patch procedure and technical manual is available upon request.





The Homco Casing Patch is an internal steel liner having a standard wall thickness of 1/8 inch. Available in 20 foot lengths up to several hundred feet, they are corrugated longitudinally to provide clearance for running inside casing. Covered with a glass mat and coated with epoxy resin, the patch is expanded to conform symmetrically to the casing bore. Casing diameter is reduced .300 inch using the standard 1/8 inch liner and .480 inch using the heavier wall liner. Special liners are available for high pressure and temperature operators as well as H_2S, CO_2 and corrosive conditions.

Casing Patch – Case Histories

Location	Pipe Size	Repair Depth	Patch Length (Feet)	Remarks	Results of Pressure Test of Patch (PSI)
Unwanted Perforations					
Texas	2⅞"	12,862	40	Dual Well	2,500
Kalimantan, Indonesia	7"	2,580-4,676	10, 20, 30	3 Patch Set	3,800
Offshore, Louisiana	7"	8,202-8,470	20, 20, 20	Block Squeeze Perforations, 3 Patch Set	2,000
Louisiana	7"	12,850-13,492	50, 110, 50, 40	4 Patches Set	2,000
North Sea	7"	10,066-10,265	125, 60, 35	3 Patches Set, 58 Degree Hole Deviation	3,000
North Sea	7"	8,510-8,808	39, 69, 20, 62, 79	5 Patches Set, 46 Degree Hole Deviation	
Indonesia	7"	2,586-4,676	(4-10), (3,20), (2,30)	9 Patches Set	700
Split Tubing/Casing					
Texas	2⅞"	1,712	30	Dual Well	1,500
Canada	7"	1,045	13	Lead Seal Patch	
Wyoming	7"	5,000	30	12 Ft. Part	250
Texas	9⅝"	9,142	60	30 Degree Hole Deviation	
Louisiana	10¾"	633	40	30 Ft. Split	1,000
Leaking Tubing/Casing					
Texas	3½"	3,900	20	Thread Leaks in Internal Upset Tubing	1,500
Southern California	13⅜"	510	30	High Temperature-Lead Covered 3/16" Wall-Liner	
Offshore Alabama	13⅜"	1,590	100	5 Degree Hole Deviation	1,000
Corrosion					
Canada	5½"	4,880	40	Lead Patch Seal	1,500
Louisiana	7"	1,490-1,497	9	Salt Water Disposal Well	580
Dubai	9⅝"	4,802	20	39 Degree Hole Deviation Low Fluid Level Well	
Window					
Offshore Louisiana	9⅝"	3,500	40	47 Degree Hole Deviation Window = 8" Wide x 4' long	1,000

Weatherford has 200 locations worldwide. For specific information on the Casing Patch call your nearest Weatherford location or phone our Product Manager at 713/485-1899.

Weatherford is a diversified international energy services and manufacturing company. The Houston-based firm provides pipeline services tubular running services; fishing and rental tools and services; cementation and elastomer products; gas compression equipment; offshore cranes and other specialized equipment to the oil,gas, and pipeline industries.

Weatherford

Corporate Headquarters

Weatherford
P.O. Box 27608
Houston, Texas 77227-7608
Phone: 713/439-9400
Fax: 713/621-0994

Weatherford and Homco are trademarks of Weatherford.

Weatherford services and products are subject to Weatherford standard terms and conditions.

©1995. Weatherford. All rights reserved.
WFD 94070/6M10-95

Brochure No. 10.00